

What is claimed is:

1. An information storage apparatus comprising:  
a storage medium including a plurality of  
5 information tracks; and  
a head assembly having:  
a substantially planar surface; and  
a plurality of read/write heads positioned in  
registry with said information tracks;
- 10 wherein the read/write heads are arranged substantially  
in the plane of said planar surface and wherein said  
information storage medium and said head assembly are  
arranged in mutually sliding abutment such that said  
read/write heads are substantially in sliding contact
- 15 with the outer surface of the information storage medium  
in use.
- 20 2. An information storage apparatus as claimed in  
claim 1 wherein said heads are provided on a monolithic  
layer.
- 25 3. An information storage apparatus as claimed in  
claim 1 wherein the heads are fixed in position and the  
information storage medium overlies the heads a  
lubricating layer provided therebetween.
- 30 4. An information storage apparatus as claimed in  
claim 3 wherein said lubricating layer comprises a self-  
lubricating layer on at least one of the storage medium  
and head array.
5. An information storage apparatus as claimed in

claim 4 wherein said self-lubricating layer comprises an artificial diamond coating.

6. An information storage apparatus as claimed in  
5 claim 1 wherein all of the read/write heads are mounted  
on a single member.

7. An information storage apparatus as claimed in  
claim 6 wherein said member is generally sized and  
10 shaped to correspond to the size and shape of the  
information storage medium.

8. An information storage apparatus as claimed in  
claim 7 wherein said information storage medium and said  
15 head assembly comprise similar substrates.

9. An information storage apparatus as claimed in  
claim 1 wherein said storage medium and read/write heads  
are resiliently biased together.

20 10. An information storage apparatus as claimed in  
claim 1 wherein the heads are arranged topologically in  
a rectangular array.

25 11. An information storage apparatus as claimed in  
claim 10 wherein said head array comprises connections  
to both ends of the rows and columns.

30 12. An information storage apparatus as claimed in  
claim 1 wherein the head assembly comprises pre-  
processing and/or pre-amplification circuitry for pre-  
processing and/or pre-amplifying data read by said heads

prior to being output from the head assembly.

13. An information storage apparatus as claimed in  
claim 1 wherein said storage medium and/or said head  
5 assembly comprises a substrate of glass having a  
coefficient of expansion less than 1 nm per 100 mm per  
Kelvin temperature rise.

14. An information storage apparatus as claimed in  
10 claim 1 wherein at least one read/write head is provided  
for all of the tracks that are available for information  
storage on the storage medium.

15. An information storage apparatus as claimed in  
15 claim 1 comprising a refresh sub-assembly for ensuring  
that an optimal signal strength is maintained.

16. An information storage apparatus as claimed in  
claim 15 wherein the refresh sub-assembly comprises a  
20 signal strength monitor for monitoring a signal strength  
available from the storage medium, said refresh sub-  
assembly means being arranged to rewrite the received  
signal if the signal strength available falls below a  
predetermined threshold.

25  
17. An information storage apparatus as claimed in  
claim 1 wherein the head assembly and information  
storage medium are resiliently biased towards one  
another.

30  
18. An information storage apparatus as claimed in  
claim 1 wherein each bit of storage on said storage

medium is associated with just one head.

19. An information storage apparatus as claimed in  
claim 1 comprising an information transfer sub-assembly  
5 to transfer information to or from the read/write heads.

20. An information storage apparatus as claimed in  
claim 10 wherein said read/write heads are formed by  
deposition onto a glass ceramic wafer, said wafer being  
10 formed with connections to the heads.

21. An information storage apparatus as claimed in  
claim 1 comprising a tracking sub-assembly to adjust the  
positioning of the read/write heads of the drive so that  
15 each head is correctly aligned with its particular track  
on the storage medium.

22. An information storage apparatus as claimed in  
claim 21 wherein said tracking sub-assembly comprises  
20 one or more piezoelectric elements.

23. An information storage apparatus as claimed in  
claim 22 wherein one or more piezoelectric elements  
is/are arranged to adjust the position of all of said  
25 heads together.

24. An information storage apparatus as claimed in  
claim 22 wherein said one or more piezoelectric elements  
is/are arranged to act on the structure or element on  
30 which the read/write heads are mounted to cause a degree  
of deformation of the supporting structure or element  
such that the heads mounted thereon undergo movement and

can be adjusted in position.

25. An information storage apparatus as claimed in  
claim 1 comprising an oscillation drive mechanism for  
5 oscillating the information storage medium with respect  
to the head assembly.

✓

26. An information storage and retrieval apparatus  
comprising an information storage medium comprising an  
10 information storage area, and an array of information  
read and/or write heads, the information storage medium  
and array of heads being arranged to be oscillated with  
respect to each other in use such that each region of  
the information storage area is aligned with at least  
15 one of said read/write heads during said oscillation.

27. An apparatus as claimed in claim 25 comprising a  
piezo-electric actuator for driving said oscillation.

20 28. An apparatus as claimed in claim 26 comprising a  
piezo-electric actuator for driving said oscillation.

29. An apparatus as claimed in any of claims 28 wherein  
said array of heads is provided on a member having a  
25 substantially planar surface said heads being  
substantially coplanar with said surface.

30. An apparatus as claimed in claim 28 wherein said  
heads are arranged in mutually sliding abutment with  
30 said information storage medium.

31. An apparatus as claimed in claim 25 comprising two

oscillating information storage media or head arrays arranged to oscillate in anti-phase.

32. An apparatus as claimed in claim 26 comprising two  
5 oscillating information storage media or head arrays arranged to oscillate in anti-phase.

33. An apparatus as claimed in claim 26 wherein the array of heads is the same size and shape as the  
10 information storage area.

34. An apparatus as claimed in claim 25 wherein the information storage medium and array of heads are arranged to oscillate linearly relative to one another.

15

35. An apparatus as claimed in claim 26 wherein the information storage medium and array of heads are arranged to oscillate linearly relative to one another.

20 36. An apparatus as claimed in claim 25 wherein said array of heads and said information storage medium are rectangular.

25 37. An apparatus as claimed in claim 26 wherein said array of heads and said information storage medium are rectangular.

38. An apparatus as claimed in claim 1 wherein said information storage medium comprises a disk.

30

39. An apparatus as claimed in claim 26 wherein said information storage medium comprises a disk.

40. An information storage apparatus comprising a plurality of read/write heads, wherein the read/write heads are arranged such that in use each track of an 5 information storage disk can be accessed by more than one read/write head.

41. An information storage apparatus as claimed in claim 40 wherein the read/write heads are provided in a 10 number of sets, each set of read/write heads extending across all of the available tracks of the information storage disk.

42. An information storage apparatus as claimed in 15 claim 40 wherein a first set of read/write heads comprises a generally linear arrangement of read/write heads that extends radially across all tracks of the information storage disk or laterally across a rectangular information storage member.

20 43. An information storage apparatus as claimed in claim 42 comprising a further set of read/write heads in a similar arrangement to said first set of heads but spaced circumferentially or longitudinally therefrom.

25 44. An information storage apparatus as claimed in claim 43 wherein each set of read/write heads is provided along an arcuate line.

30 45. An information storage apparatus as claimed in claim 44 wherein each set of read/write heads follows a generally spiral curve so that a number of sets of

read/write heads are provided adjacent to each other and the spacing between multiple heads of each track increases from the innermost track to the outmost track.

5 46. An information storage apparatus comprising a read/write head assembly comprising a plurality of read/write heads, wherein the read/write heads are arranged in an arc formation such that in use the read/write heads are positioned along an arcuate line  
10 extending across the tracks of an information storage disk with each read/write head located generally above a corresponding track.

47. An information storage apparatus as claimed in  
15 claim 38 comprising an information storage disk arranged to rotate relative to the read/write heads at a rotational speed of less than 600 revolutions per minute.

20 48. An information storage apparatus comprising an information storage disk and at least one read/write head arranged to read information from or write information to said disk, wherein said disk is arranged in use to revolve relative to said read/write head at a  
25 speed of less than 600 revolutions per minute.

49. An information storage apparatus as claimed in  
claim 38 wherein the read/write heads are mounted so  
that they extend in a line from the innermost track on  
30 the disk to the outermost track on the disk with each  
read/write head positioned to overlie a particular track.

6

50. An information storage apparatus comprising a plurality of read/write heads arranged such that in use data can be read from or written to an information 5 storage medium, wherein in use the position of one or more read/write heads is adjustable by means of one or more piezoelectric elements or the entire detector surface to enable the alignment of the read/write heads and the tracks of the medium to be adjusted.

10

51. An information storage apparatus as claimed in claim 38 wherein a central portion of said information storage medium forms part of an induction motor.

15

52. A data storage device comprising:

a data storage medium;

an array of heads for writing and reading data to/from said data storage medium; and  
an oscillating drive mechanism for oscillating  
20 said data storage medium and said array of heads  
linearly relative to one another.

8

20

53. A method of retrieving data from a non-volatile storage medium comprising passing an array of heads over said storage medium such that each head traverses only a minor portion of said medium in the direction of their relative movement, reading data from one or more of said heads and outputting the read data.

30

54. A method as claimed in claim 53 comprising reading all required data in a single pass.

4